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BELT CONVEYOR WITH EASILY DETACHABLE/ATTACHABLE BELT FOR METAL DETECTOR

[Kinzokukenshutsukiyo beruto kanichakudatsugata konbeya]

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[Claim(s)]

[Claim 1] Belt conveyor with easily detachable/attachable belt for metal detector, comprising an endless belt operated between an operating pulley and non-operating pulley by passing through the detection space of detection coil of a metal detection machine which detects a metal using a detection coil comprising a magnetically excited coil and signal reception coil;

wherein said conveyor is characteristically designed as following:

The frame of said belt conveyor is divided into a body section and tip section from the middle of the tip of non- driving pulley side and said detection coil location and supported by the main body, while the tip part is connected to said main body at the division location by support pins and supported by the main body to allow the tip part to rotate upwardly from the horizontal plane;

the shafts at both ends of said non-driving pulley and driving pulley are detachably stored in the spaces of the storing body formed at the end face of said tip section and the other end face at the opposite side of said division location of the main body;

the storing parts that store both ends of said non-driving pulley are supported by the end face of said tip part by a support body internally containing a spring for proving constant stress force to the conveyor belt;

the drive wheel mounted at the shaft end of the drive pulley and the floating wheel on the motor side fixed to the main body are mutually connected by a drive chain which constantly receives appropriate stress force from a floating wheel supported by the main body with a fixed support body that can transfer by sufficient strokes; and

the slide plate positioned in the middle between the upper flat face and lower flat face of said conveyor belt has a width slightly wider than said conveyor belt width, divided into several sections along the total length of the conveyor belt and supported on the frame, and is detached from the frame by being lifted in the upward direction.

[Detailed Explanation of this Invention]

[0001] [Industrial Application]

This design is related to the metal detection machine currently widely used in the broad industrial fields, such as chemistry, food, sewing, and various raw material industries.

[0002] [Description of the Prior Art]

For simple attachment/detachment of the belt of this kind of belt conveyor, various kinds of designs were tried and practically applied. However, to remove a conveyor belt, most methods need to remove the entire conveyor frame to separate from the sensing coil section of the support frame of a metal detection machine, and not many systems can easily remove belt alone.

[0003] [Problem(s) to be Solved by the Device]

Removal of a conveyor belt of metal detector is generally necessary for replacing an old or damaged belt as well as cleaning the belt. However, in the case of metal detection machine which inspects food etc., the belt frequently needs to be detached and attached back for cleaning. In such application, it is very convenient if the belt alone can be easily removed from the machine. However, machines allowing such convenience are not commonly available.

[0004] This design offers a conveyer for a metal detection machine, allowing easily detaching and attaching the belt.

[0005] [Means for Solving the Problem]

In order to attain this purpose, this design provides a conveyer for a metal detection machine, easily allowing detaching and attaching its belt, by connecting the part at the top pulley side of conveyer frame with a pin supporting point, providing swinging motions of the part, bending with a belt cliff to allow sufficient slack to the belt, and removing said pulley so as to easily loosen the drive chains at one drive side. Furthermore, the whole drive pulley is easily removed by transferring a floating wheel, thus freeing the belt. Then, by removing the slide plate below the belt, being arranged to be removed by merely pulling up, the belt can be easily separated from the machine. That is, by removing a minimum

number of structural parts while leaving the main frame intact, the conveyor belt can be easily detached.

[0006] [Example]

The example of this design is explained based on the figures below. Figure 1 is the perspective view of the conveyor for metal detection machines allowing simple detaching/attaching of its belt according to this design. In Fig. 1, the reference numeral **1** denotes a sensor coil of a metal detection machine, which is supported by a buffer tool **2** absorbing any oscillation movements. The reference numeral **4** denotes a conveyor belt which is driven with the top pulley **5** and drive pulley **6**, lightly sliding in the direction of 'A' on the slide plate **7** fixed by the gourd-like hole **24**, bis with a head, and slide plates **8, 9, 10** joined with the engagement holes by headless bis (see Fig. 3). The main frame **3** is divided into two sections at the middle area of the top pulley **5** and detection coil **1**, and its tip frame sections **11, 11'** are supported by support plates **12, 12'** formed at one section of main frame **3** and support pins **13, 13'**, being allowed to swing from the horizontal plane. As shown in Fig. 4, the top pulley is designed to feely rotate around the shaft **15** internally containing a rolling bearing **14**, while both ends of the shaft **15** are inserted into the tension hardware **17, 17'** fitted in the dented slide parts **16, 16a'** with the fixing metals **16, 16'** and fixed by the setting screws **18, 18'**. The tension hardware **17** and **17'** have a screw rod **23** fitted to the fixing ribs **19, 20** having holes of said frames

11, 11′ (omitted at the object side), supporting the top pulley 5 to allow the pulley 5 to horizontally slide by slightly pushing toward the tension direction of the belt 4 at the time of normal assembly operation. Figure 2 shows the side elevation of conveyor head parts, such as the support pin 13 and the top pulley 5, and Fig. 3 shows one side of the flat surface of the same area. When the top pulley 5 is lifted in the direction of U in the illustration at the time of decomposing and detaching the belt 4, since the center of rotation 13 (i.e., the supporting point) is shifted to the upper location from the normal center of the top pulley 15, the belt 4 having insufficient length near the location shown with a chained line in the figure, compresses the spring 21 for the amount of D shown in the figure. However, by swinging upwardly with increased angles, the belt passes this branching point to become completely loose and removable. This branching point located at the upper position means that the main frame 3 in operation and the frame 11 can be loosely positioned without any fixing parts, thereby minimizing the decomposition steps. This is another reason for providing a spring 21 to the tension hardware 17. The reason for providing the gourd hole 24 only to the plate 7 of the slide plates 7, 8, 9, 10 is that, when the belt 4 is sufficiently loosened by lifting up the frames 11, 11′, a simple hole alone causes the plate 7 to easily fall off. Therefore, the smaller side of the gourd hole 24 is normally fastened by a bis having a head during the normal operation to prevent the

plate **7** from falling, and when removing the plate **7**, the plate **7** is shifted to the larger diameter side of the gourd hole **24** and lifted up and removed. The drive pulley **6** is supported by the square shaped bearings **26, 26'** allowing any rotation of the pulley **6**, while these bearings **26, 26'** are fixed to the angled crevice slits **26, 26a** at the tail of the main frame **3** by the screws **27, 27'**. The axial end of the drive pulley **6** is equipped with a drive pulley **28** connecting the motor **29** provided in the main frame **3** and driving wheel **30**/floating wheel **31** with chains **32** so as to operate the conveyor. Figure 4 shows the anchoring relation (cross section B-B of Fig. 1) between the floating wheel **31** and the main frame **3**. The floating wheel **31** is rotationally supported by the bearing **35** of the clamp lever **34** with a shaft, being fixed by the long hole **33** having the length of S in the Fig. 1 with a nut **37** via a distance piece **36**. During the normal operation, the chain **32** is pulled at the location shown in the Fig. 1. The reference numeral 38 denotes the baffle of a nut **37** and is welded to the main frame **3** along the entire length **S**. The belt **4** is decomposed and removed in the following manner: (1) By loosening the clamp lever **34** to transfer the float wheel **31** for a distance **S** along the long hole **33** to the location **31'**. As a result, chain **32** is loosened and can be easily removed from the driving wheel **30** and drive pulley **28**. By significantly loosening the belt **4** at the top part of said conveyor and removing the drive chain **32** can make succeeding dismantling the belt easier. (2) Then, the screw with a

head is dodged at the hole with a largest diameter of the gourd hole **24**, and this plate **7** is pulled up and removed. (3) Next, since slide plates **8**, **9**, and **10** are connected in the loose hole by the headless screw, they can be easily taken out by pulling up. (4) The tip of the frame is bent toward the upper side from the support pins **13**, **13** so as to provide slack to the conveyor belt **4**. (5) By loosening the respective screws **18**, **18'** and **27**, **27'** holding the pulleys **5**, **6**, the both pulleys **5**, **6** can be easily pulled out from the square slits **26a**, **26a'** of the main frame **3** and square slits **16a**, **16a'** of the tension hardware **17**. (6) Therefore, since the width W of the belt **4** is made slightly wider at the support parts of the slide plates **7**, **8**, **9**, **10**, by pulling out both ends of pulleys **5**, **6** from the belt **4** (see Fig. 3), the belt **4** an be pulled out from the detection coil **1**, thereby being able to be completely detached.

[0007] [Effect of the Device]

As explained in detail above, this design allows a conveyor belt to be removed from the body of a metal detection machine by taking out the minimum number of components within the minimum time required for decomposition operation, while also allowing the belt to be mounted back by reversely operating the belt removal process. Therefore, less labor is required. This design is extremely convenient for applications, such as the metal detection machine for handling food for frequently removing the belt from the machine for

cleaning. Thus, this design can provide significant practical effectiveness.

[Brief Description of the Figures]

[Figure 1] Perspective view showing the example of this equipment.

[Figure 2] Partially detailed side face of the device of this design.

[Figure 3] Partially detailed top view of the device of this design.

[Figure 4] Partially detailed cross-sectional face of the device of this design.

[Description of Notations]

1…Sensing Coil of Metal Detection Machine; 2…Buffer Implement; 3...Main Frame; 4...Conveyor Belt; 5...Top Pulley; 6...Drive Pulley; 7, 8, 9, 10...Slide plate; 11, 11'…Point frame; 12, 12'...Support plate; 13, 13'...Support pin; 14...Bearing; 15...Shaft; 16, 16'...Fixed hardware; 16a, 16a'…Slit section; 17, 17'…Tension hardware (hold object); 18, 18'...Set screw; 19, 20...Fixed rib; 21...Spring; 22...Adjusting Nut; 23...Screw-Thread Rod; 24...Gourd-like Hole; 25...Head-less Screw; 26, 26'...Bearing of a square shape; 26a, 26a'...Angle concave slit section; 27, 27'...Screw; 28…Drive Pulley; 29...Motor; 30...Float wheel; 31...Float wheel; 32...Chain; 33...Long Hole; 34...Clamp Lever; 35...Bearing; 36...Distance Piece; 38...Baffle

Figure 4

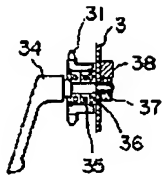

Figure 3

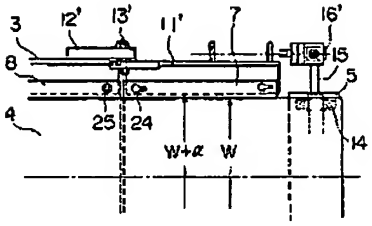

Figure 1

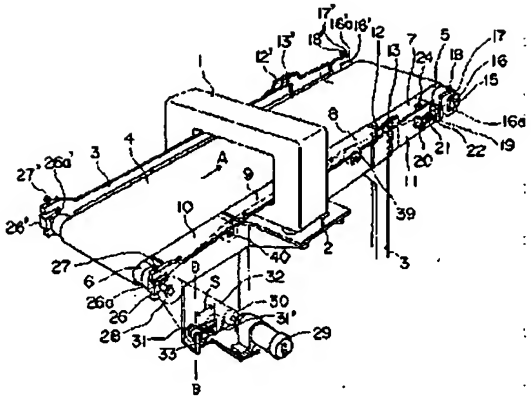

Figure 2